

What is Claimed is:

1. A delivery system for inclusion in an edible composition comprising at least one active component encapsulated within an encapsulating material, the delivery  
5 system having a tensile strength of at least 6,500 psi.

2. The delivery system of claim 1 wherein the tensile strength of the delivery system is from about 6,500 psi to 200,000 psi.

10 3. The delivery system of claim 1 wherein the edible composition is selected from the group consisting of food products, pharmaceutical compositions, foodstuffs, nutrient-containing compositions, vitamins, and neutraceuticals.

15 4. The delivery system of claim 1 wherein the edible composition is selected from chewing gum compositions, confectionery compositions and beverage compositions.

20 5. The delivery system of claim 1 wherein the encapsulating material is selected from the group consisting of polyvinyl acetate, polyethylene, crosslinked polyvinyl pyrrolidone, polymethylmethacrylate, polylactidacid, polyhydroxyalkanoates, ethylcellulose, polyvinyl acetatephthalate, polyethylene glycol esters, methacrylicacid-co-methylmethacrylate and combinations thereof.

6. The delivery system of claim 1 wherein the encapsulating material is present in an amount of from about 30% to 99% by weight based on the total weight of the delivery system.

5 7. The delivery system of claim 1 wherein the encapsulating material is present in an amount of from about 60% to 90% by weight based on the total weight of the delivery system.

8. The delivery system of claim 1 wherein the active component is selected  
10 from the group consisting of sweeteners, acids, flavorants, pharmaceuticals, therapeutic agents, vitamins, breath fresheners, cooling agents and combinations thereof.

9. The delivery system of claim 8 wherein the sweetener is a high intensity sweetener.

15 10. The delivery system of claim 8 wherein the sweetener is selected from the group consisting of amino acid-based sweeteners, dipeptide sweeteners, glycyrrhizin, saccharin and its salts, acesulfame salts, cyclamates, steviosides, talin, dihydrochalcone compounds, chlorinated sucrose polymers and combinations thereof.

20 11. The delivery system of claim 9 wherein the high intensity sweetener is selected from the group consisting of neotame and aspartame.

12. The delivery system of claim 8 wherein the active component is present in an amount of from about 1% to 70% by weight based on the total weight of the delivery system.

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13. The delivery system of claim 1 wherein the active component is present in an amount of from about 10% to 40% by weight based on the total weight of the delivery system.

10 14. The delivery system of claim 1 further comprising a tensile strength modifying agent.

15 15. The delivery system of claim 14 wherein the tensile strength modifying agent is selected from the group consisting of fats, emulsifiers, plasticizers, softeners, low molecular weight polymers, high molecular weight polymers, waxes and combinations thereof.

20 16. The delivery system of claim 14 wherein the tensile strength modifying agent is selected from the group consisting of hydrogenated oils, glycerol monostearate, waxes, low molecular weight polymers, triacetin, glycerin, rosin esters, and combinations thereof.

17. The delivery system of claim 14 wherein the tensile strength modifying agent is present in an amount of up to 40% by weight based on the total weight of the delivery system.

5 18. The delivery system of claim 1 in the form of particles or granules.

19. The delivery system of claim 18 wherein the particles or granules have a particle size of up to 600 microns.

10 20. The delivery system of claim 19 wherein the particles or granules have a particle size of 75 to 600 microns.

21. An edible composition comprising at least one edible composition forming component and a delivery system comprising at least one active component  
15 encapsulated within an encapsulating material, the delivery system having a tensile strength of at least 6,500 psi.

22. The edible composition of claim 21 selected from the group consisting of chewing gum compositions, food products, confectionery compositions, pharmaceutical  
20 compositions, beverages, foodstuffs, nutrient-containing compositions, vitamins, and neutraceuticals.

23. The edible composition of claim 21 wherein the encapsulating material is present in an amount of from about 0.2% to 10% by weight based on the total weight of the edible composition.

5 24. A chewing gum composition comprising gum base and a delivery system comprising at least one active component encapsulated within an encapsulating material, the delivery system having a tensile strength of at least 6,500 psi.

10 25. The chewing gum composition of claim 24 wherein the tensile strength of the delivery system is from about 6,500 psi to 200,000 psi.

15 26. The chewing gum composition of claim 24 wherein the encapsulating material is present in an amount of from about 30% to 99% by weight based on the total weight of the delivery system.

20 27. The chewing gum composition of claim 24 wherein the active component is selected from the group consisting of sweeteners, acids, flavorants, pharmaceuticals, therapeutic agents, vitamins, breath fresheners, cooling agents and combinations thereof.

28. The chewing gum composition of claim 24 wherein the active component is present in an amount of from about 1% to 70% by weight based on the total weight of the delivery system.

5 29. The chewing gum composition of claim 24 wherein the encapsulating material further comprises a tensile strength modifying agent.

30. The chewing gum composition of claim 29 wherein the tensile strength modifying agent is selected from the group consisting of fats, emulsifiers, plasticizers,  
10 softeners, low molecular weight polymers, high molecular weight polymers, waxes and combinations thereof.

31. A confectionery composition comprising a confectionery carrier and a delivery system comprising at least one active component encapsulated within an  
15 encapsulating material, wherein the delivery system has a tensile strength of at least 6,500 psi.

32. The confectionery composition of claim 31 wherein the tensile strength of the delivery system is from about 6,500 to 200,000 psi.

33. The confectionery composition of claim 31 wherein the encapsulating material is present in an amount of from about 30% to 99% by weight based on the total weight of the delivery system.

5           34. The confectionery composition of claim 31 wherein the active component is selected from the group consisting of sweeteners, acids, flavorants, pharmaceuticals, therapeutic agents, vitamins, breath fresheners, cooling agents and combinations thereof.

10           35. The confectionery composition of claim 31 wherein the active component is present in an amount of from about 1% to 70% by weight based on the total weight of the delivery system.

15           36. The confectionery composition of claim 31 wherein the delivery system further comprises a tensile strength modifying agent.

20           37. The confectionery composition of claim 36 wherein the tensile strength modifying agent is selected from the group consisting of fats, emulsifiers, plasticizers, softeners, low molecular weight polymers, high molecular weight polymers, waxes and combinations thereof.

38. A method of preparing a target delivery system for an edible composition comprising combining at least one active component, at least one encapsulating material, and optionally at least one additive until a preselected tensile strength of the target delivery system is obtained based on comparison with the tensile strength of at least one sample delivery system having the same or similar active component and a known release rate of the active component.

39. The method of claim 38 further comprising obtaining a preselected tensile strength based on a comparison with a plurality of sample delivery systems.

40. The method of claim 38 further comprising:

(a) obtaining a plurality of sample delivery systems comprising the at least one active component and the at least one encapsulating material wherein each of said sample delivery systems has a different tensile strength;

(b) testing the sample delivery systems to determine the respective release rates of the active component; and

(c) formulating the target delivery system containing the same or similar active component with a tensile strength corresponding to a desired release rate of the active component based on the sample delivery systems.

41. The method of claim 38 wherein the additive is a tensile strength modifying agent.



42. The method of claim 38 wherein the tensile strength of each sample delivery system is at least 6,500 psi.

5           43. The method of claim 38 further comprising:  
                    determining a desired release rate for the at least one active  
component in the edible composition;  
                    determining a tensile strength associated with the desired release  
rate; and  
10                      formulating the target delivery system for the at least one active  
component based, at least in part, on the tensile strength.

44. The method of claim 43, wherein the tensile strength is at least 6,500 psi.

15           45. The method of claim 43, wherein the target delivery system includes at  
least one additive.

46. The method of claim 43, further comprising:  
                    associating a different tensile strength for each of a plurality of  
20    release rates for each of a plurality of different active components.

47. A method of preparing a target delivery system for an edible composition useful for delivering at least one active component at a desired release rate, said method comprising the step of encapsulating the at least one active component in an encapsulating material in a manner that provides the target delivery system with a  
5 tensile strength of at least 6,500 psi.

48. A method of preparing an edible composition having at least one active component which releases the at least one active component at a desired release rate, said method comprising the steps of:

10                    encapsulating the at least one active component in at least one encapsulating material to form a target delivery system having a tensile strength of at least 6,500 psi; and

                    adding the target delivery system to the edible composition.

15            49. A method of selecting at least one delivery system suitable for incorporation into an edible composition, each of said delivery systems comprising an active component encapsulated within an encapsulation material, said method comprising:

                    determining a desired release rate for a first active component in  
20 the edible composition;

                    determining a first desired tensile strength for a first delivery system associated with said desired release rate; and

selecting a first delivery system for first said active component based, at least in part, on said first tensile strength.

50. The method of claim 49 further comprising:

5 determining a second desired release rate for a second active component in the edible composition;

determining a second desired tensile strength for a second delivery system associated with said second desired release rate; and

10 selecting a second delivery system for said second active component based, at least in part, on said second tensile strength.

51. The method of claim 50 further comprising repeating the steps of determining a desired release rate, determining a desired tensile strength and selecting a delivery system for at least one additional active component of the edible composition.

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52. The method of claim 51, wherein the tensile strength is at least 6,500 psi.

53. The method of claim 51, wherein the delivery system further comprises at least one additive.

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54. The method of claim 53, wherein the additive is a tensile strength modifying agent.

55. The method of claim 51, wherein the step of determining the desired tensile strength comprises:

associating a different tensile strength for each of a plurality of  
5 release rates of said at least one active component.

56. The method of claim 55, wherein the step of determining the desired tensile strength comprises:

associating a different tensile strength for each of a plurality of  
10 release rates for each of the plurality of active components.

57. The method of claim 55, further comprising:

determining a desired tensile strength for each of a plurality of  
delivery systems.

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58. A method of preparing a target delivery system for an edible composition useful for delivering at least one active component at a desired release rate, said method comprising encapsulating the at least one active component in an encapsulating material in a manner that provides the target delivery system with a target  
20 tensile strength associated with the desired release rate, enabling the delivery system to release the at least one active component from the edible composition at the desired release rate.

59. The method of 58 wherein the target tensile strength is at least 6,500 psi.

60. The method of claim 59 comprising:

- 5           a)     determining the desired release rate of the active component;
- b)     determining the target tensile strength of the delivery system  
capable of delivering the at least one active component at the desired release rate; and
- c)     formulating the target delivery system containing the at least one  
active component having the target tensile strength.

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61. A method of preparing an edible composition containing a target delivery  
system useful for delivering at least one active component at a desired release rate,  
said method comprising encapsulating the at least one active component in an  
encapsulating material in a manner that provides the target delivery system with a target  
15   tensile strength associated with the desired release rate enabling the delivery system to  
release the at least one active component from the edible composition at desired  
release rate, and adding the target delivery system to the edible composition.

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